

6.4 SAND AND GRAVEL FACILITIES

6.4.1 Introduction

Sand and gravel facilities regulated under the Third Management Plan are those facilities that produce sand and gravel and use more than 100 acre-feet of water, from any source, in a calendar year. Sand and gravel facilities may mine aggregate, mix concrete, and produce asphaltic concrete.

6.4.2 Water Use by Sand and Gravel Facilities

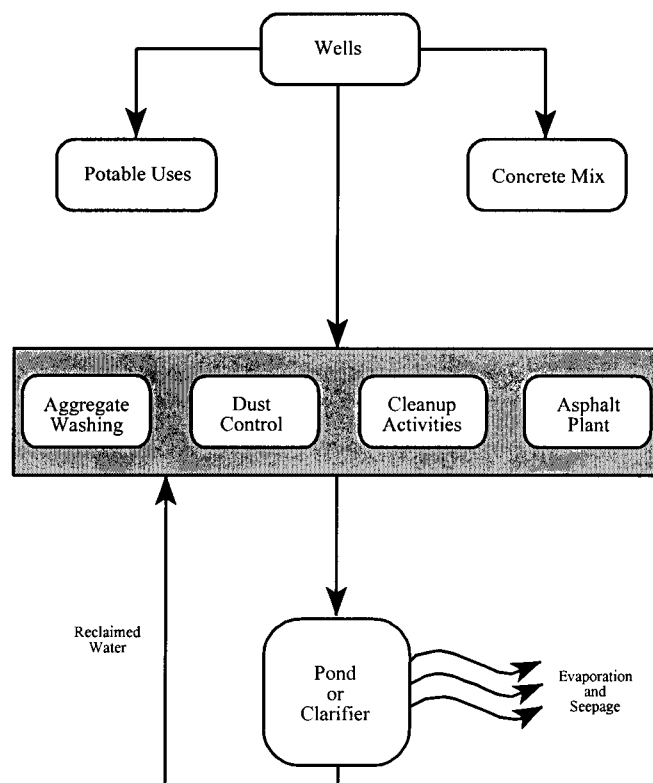
In the Pinal AMA, there are six sand and gravel facilities, which hold Type 2 grandfathered rights and groundwater withdrawal permits totaling 3,491 acre-feet. In 1995, sand and gravel facilities in the AMA withdrew only 253 acre-feet of groundwater, or just greater than 7 percent of their total annual allotments. Since the beginning of the second management period, all water use in this subsector has come from just two facilities. It is projected that sand and gravel water use will grow commensurate with economic development in the AMA, reaching about 700 acre-feet by the year 2025.

Sand and gravel facilities mine unconsolidated streambed deposits to produce construction materials. The aggregate is sorted according to grain size and washed to remove fine-grained particles. Aggregate washing accounts for the bulk of water use by sand and gravel facilities. In addition to using water for washing, water is used for the following purposes: (1) to produce ready-mix concrete, bricks, blocks, and asphaltic concrete; (2) to control dust; (3) to wash the outside of vehicles; (4) to wash the inside of mixer drums; (5) to wash other equipment; (6) to cool equipment; (7) to cool material; and (8) for domestic purposes. Figure 6-1 illustrates how water is cycled in a typical sand and gravel facility.

Most sand and gravel facilities recycle wash water using excavated pits called disposal ponds. Sediment-laden wash water is pumped or diverted into a pit or series of pits where sediment is allowed to settle out. After this sediment settles out, the water is recycled to the plant and used to wash more material. Water can also be pumped from the pond for dust control, truck washing, or other cleanup activities.

Geologic and hydrologic conditions at some facilities may result in a large amount of seepage loss incidentally returning to the aquifer from disposal ponds, resulting in the incidental recharge of the aquifer. Because many facilities are located along riverbeds, depth to groundwater can be relatively shallow. Some sand and gravel facilities may need to dewater to lower the water table in order to excavate. Water lost to seepage may become a component of the groundwater pumped by sand and gravel facilities.

**FIGURE 6-1
DIAGRAM OF WATER FLOW IN A TYPICAL
SAND AND GRAVEL FACILITY**



An alternative method of recycling wash water is the use of clarifiers. A clarifier is a device that accelerates the settling of sediment without creating the need for a large disposal pond. Chemical flocculants are usually used in conjunction with clarifiers to further enhance the removal of solid particles from the wash water.

Recycled water is not used for mixing concrete because the use of recycled water in the mixture may result in a product of inferior strength and quality. However, aggregate used in the concrete can be washed with recycled water without affecting concrete strength.

The ability of sand and gravel facilities to save water varies because of differences in geology, availability and cost of land and water, product demand and price, and other factors. It may therefore be economically feasible to use the latest commercially available conservation technology at some facilities but not at others.

Because recycled water can be used for most purposes at a sand and gravel facility, the maximum savings of water can occur in the recycling of wash water from aggregate washing and, to a lesser extent, the recycling of water used for wet scrubbers at asphalt plants.

There are a number of conservation techniques that may be employed to reduce the amount of water used to control dust raised by trucks traveling on haul roads. Binding agents, pavement, or other surface treatments may be used. Water uses for cleanup activities may be made more efficient by metering truck washing and by using alternative methods to clean truck mixer drums, such as the “rock out” method, which means agitating rock inside the mixer drums for the purpose of cleaning excess concrete, or chemical set-arresting agents, which prevent excess concrete from adhering to the mixer drums.

Sand and gravel facilities that have asphalt plants may have air emissions from the plant cleaned by either baghouses or wet scrubbers. Of these two methods, baghouses do not require water.

6.4.3 Program Development and Issues

A requirement to recycle wash water using disposal ponds or clarifiers was set forth in the First Management Plan. This requirement ensures that sand and gravel facilities reduce their primary water use. The First Management Plan requirements were carried over into the second management period.

In order to identify the most economical conservation methods for each facility, sand and gravel facility managers were required during the second management period to evaluate specific water-saving methods and submit a conservation plan to the Department.

Besides the conservation requirements identified in the First and Second Management Plans, there are a number of economical ways water use could be reduced for dust control and cleanup activities. However, because conditions and characteristics at each facility vary, flexibility is needed to allow facility managers to select the requirements most appropriate for their facility.

6.4.4 Sand and Gravel Conservation Program

The First and Second Management Plan requirements to recycle wash water are carried over into the third management period because they improve water use efficiency and can be applied at all sand and gravel facilities.

Sand and gravel facility managers can achieve the greatest water savings by applying the most appropriate conservation methods for their facility. In addition to recycling wash water, sand and gravel facilities will choose two additional requirements, one of which is related to water used for dust control, the other of

which is related to cleanup activities or disposal pond surface area reduction, that are most appropriate for their facility for the third management period.

Similar to the Second Management Plan, sand and gravel facility managers are required under the Third Management Plan to evaluate specific water-saving methods and submit a conservation plan to the Department. The plan for improving water use efficiency during the third management period must be submitted to the director by January 1, 2002 or within 180 days after notification of the conservation requirements, whichever is later.

The implementation of some water conservation practices or technologies can result in increased profits. Sand and gravel facility managers should analyze conservation methods to identify those that will result in a positive economic return. Operators will be required to perform an economic analysis of three potential conservation practices: disposal pond surface area reduction, use of clarifiers, and the use of alternative water supplies. The following potential costs and savings should be calculated in the economic analysis:

- Labor (including planning, construction, operation, maintenance, and management time);
- Equipment (values amortized over the projected life of the equipment);
- Land value (including value of mineral reserves);
- Water costs (including pumping costs, well maintenance, and withdrawal taxes);
- Chemicals and raw materials;
- Fuel or energy costs;
- Sewage disposal costs;
- Changes in revenue caused by changing production rate, minimizing "down-time," or increasing the size of reserves; and
- Regulatory permitting costs.

6.4.5 Future Directions

As previously mentioned, sand and gravel facilities in the Pinal AMA are supplied by non-irrigation grandfathered rights or groundwater withdrawal permits. Other potential water sources include CAP water and effluent. These supplies, however, are not currently being used by sand and gravel facilities in the AMA because neither CAP water nor effluent are readily available to them. Even if CAP water were available, it costs significantly more to purchase than the cost of pumping groundwater. Pumping costs are usually low for sand and gravel facilities, which are located adjacent to rivers where groundwater levels are close to the surface. In the future, alternatives to groundwater pumping may be viable options for most water uses at sand and gravel facilities and, if so, could be addressed during subsequent management periods.

6.4.6 Industrial Conservation Requirements and Monitoring and Reporting Requirements for Sand and Gravel Facilities

6-401. *Definitions*

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes, unless the context otherwise requires, the following words and phrases used in sections 6-402 through 6-404 of this chapter shall have the following meanings:

- 1. “Alternative water supply” means a water source other than groundwater of drinking water quality.*
- 2. “Sand and gravel facility” means a facility that produces sand and gravel and that uses more than 100 acre-feet of water from any source per calendar year. For purposes of this definition, the annual water use shall include all water used by the facility regardless of the nature of the use.*
- 3. “Rock out method” means agitating rock inside concrete truck mixer drums for the purpose of cleaning excess concrete from the drums.*
- 4. “Wash water” means water used for washing or sorting sand, gravel, or other aggregates.*

6-402. *Conservation Requirements*

A. *Standard Conservation Requirements*

Beginning on January 1, 2002 or upon commencement of water use, whichever occurs later, and continuing thereafter until the first compliance date for any substitute conservation requirements in the Fourth Management Plan, an industrial user who uses water at a sand and gravel facility shall comply with the following conservation requirements:

- 1. If sufficient land area for construction and operation of disposal ponds is available at a reasonable price, the industrial user shall construct disposal ponds at the sand and gravel facility. All wash water, all water used for wet scrubbers at asphalt plants, all runoff from cleanup operations and all drainage from sand and gravel piles shall be discharged or diverted into the disposal ponds unless prohibited by state or federal environmental regulations. The disposal ponds shall contain a barge pump or sump pump of sufficient capacity, together with any necessary additional equipment, to assure the maximum reclamation of the water. The water shall be reclaimed and reused at the sand and gravel facility unless prohibited by state or federal regulations.*
- 2. If sufficient land area for the construction and operation of disposal ponds is not available at a reasonable price, clarifiers shall be used at the sand and gravel facility for reclaiming wash water, all water used for wet scrubbers at asphalt plants, runoff from cleanup operations and all drainage from sand and gravel piles. The clarifiers shall be designed and operated to assure the maximum reclamation of water. The water shall be reclaimed and reused at the sand and gravel facility unless prohibited by state or federal regulations.*

3. *At least one of the following techniques or technologies designed to reduce water use for dust control shall be implemented at the sand and gravel facility:*
 - a. *The placement of binding agents on all haul roads;*
 - b. *The paving of all haul roads;*
 - c. *The placement of recycled asphalt on all haul roads;*
 - d. *The placement of medium sized aggregate or "pea gravel" on all haul roads; or*
 - e. *A technology or technique designed to reduce water use for dust control not included in subparagraphs a through d of this paragraph that demonstrates water savings equivalent to any of the technologies or techniques listed in subparagraphs a through d, and that has been approved by the director.*

The industrial user shall have sole discretion in determining whether to implement more than one of the above technologies.

4. *At least one of the following techniques or technologies designed to reduce water use for cleaning shall be implemented at the sand and gravel facility:*
 - a. *Use of metered timers for truck washing and other cleanup activities;*
 - b. *Use of the "rock out method" of cleaning concrete from truck mixer drums;*
 - c. *Use of concrete set-arresting agent chemical applications to clean concrete from truck mixer drums; or*
 - d. *A technology or technique designed to reduce water use for cleaning that is not included in subparagraphs a through c of this paragraph that demonstrates water savings equivalent to any of the measures listed in subparagraphs a through c and that has been approved by the director.*

The industrial user shall have sole discretion in determining whether to implement more than one of the above technologies.

B. *Substitute Conservation Requirements*

1. *An industrial user who uses water at a sand and gravel facility may apply to the director to use conservation technologies other than the standard conservation requirements prescribed in subsection A of this section. The director may approve the use of substitute conservation technologies if both of the following apply:*
 - a. *The industrial user has submitted a detailed description of the proposed substitute technologies and the water savings that can be achieved by the use of those technologies; and*
 - b. *The director determines that the proposed substitute conservation technologies will result in a water savings equal to or greater than the savings that would be achieved by the standard conservation requirements prescribed in section 6-402.*

2. *If the director approves an industrial user's request to use conservation technologies other than the standard conservation requirements prescribed in subsection A of this section, the industrial user shall comply with the substitute conservation technologies approved by the director beginning on the date determined by the director and continuing until the first compliance date for any substitute conservation requirement in the Fourth Management Plan.*

C. Conservation Plan

Not later than January 1, 2002 or within 180 days after receiving notice of these conservation requirements, whichever is later, an industrial user who uses water at a sand and gravel facility, including an industrial user who acquires ownership of an existing sand and gravel facility after January 1, 2002, shall submit to the director a plan to improve the efficiency of water use at the facility on a form provided by the director. The plan shall analyze the economic feasibility of implementing all of the following techniques at the facility:

1. *Disposal pond surface area reduction.*
2. *The use of clarifiers for recycling water.*
3. *Use of an alternative water supply if such a supply is available within a one mile radius of the facility.*

6-403. Monitoring and Reporting Requirements

For calendar year 2002 or the calendar year in which the sand and gravel facility first commences using water, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the Fourth Management Plan, an industrial user who uses water at a sand and gravel facility shall include the following information in its annual report required by A.R.S. § 45-632:

1. *The quantity of water reclaimed from disposal ponds or clarifiers during the calendar year, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
2. *The quantity of water from any source, including effluent, supplied to the wash plant during the calendar year, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
3. *The quantity of water from any source, including effluent, supplied to the asphalt plant during the calendar year, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
4. *The aggregate surface area of any disposal ponds.*
5. *The average depth of any disposal ponds.*
6. *The estimated quantity of water from any source, including effluent, used during the calendar year for:*

- a. *Industrial process purposes. Water used for industrial process purposes includes water used for sanitary waste disposal but does not include water used for cooling and cleaning purposes.*
 - b. *Non-domestic cooling purposes.*
 - c. *Non-domestic cleaning purposes. Water use for non-domestic purposes includes truck washing, truck mixer drum washing, or other non-domestic cleaning purposes.*
 - d. *Road dust control.*
 - e. *Landscape watering.*
 - f. *Other purposes.*
7. *The tonnage of material washed during the calendar year.*